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THE EFFECT OF VERBAL EXPERIENCE
ON WRITTEN LANGUAGE DEVELOPMENT

BY

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
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FACULTY OF GRADUATE STUDIES

The undersigned certify that they have read, and
recommend to the Faculty of Graduate Studies for acceptance,
a thesis entitled "The Effect of Verbal Experience on
Written Language Development" submitted by Elsworth Eugene
Fox in partial fulfillment of the requirements for the
degree of Master of Education.

ABSTRACT

This study was designed to investigate the role of verbal and aural experience in the development of language. The three groups selected for the study differed both quantitatively and qualitatively in level of language exposure. The extent of exposure to language was assumed to be low for the deaf (D) subjects, higher for the low socioeconomic hearing (LSH) subjects, and highest for the upper socioeconomic hearing (USH) subjects. It was hypothesized that performance by the three groups on a writing task would reflect differences in language development occasioned by their varied language exposure.

Accordingly, a sample of 48 deaf subjects in the age range 10 to 16 years and two samples of 45 hearing children in the age range 7 to 13 years were employed.

A screening of an untitled pantomimed film was made for all subjects who subsequently wrote out the story conveyed by the film. The written stories were analyzed in terms of mean T-unit length in words. T-units were operationally defined as the minimum unit capable of being terminated with a capital and a period while preserving essential meaning.

Confirmation was obtained for the underlying hypothesis, that the extent to which the milieu of the child is verbally saturated will be directly related to the extent of his utilization of language

for the transmission of meaning. The testing of two specific hypotheses yielded the following findings:

1. Performance in the verbal cognitive task as measured by mean T-unit length was lowest for the deaf subjects, higher for the lower socioeconomic subjects and highest for the upper socioeconomic subjects.
2. Performance of females in the task exceeded the performance of the males in the upper socioeconomic hearing group but not in the deaf and lower socioeconomic hearing groups.

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CHAPTER I

THE THESIS PROBLEM

I. INTRODUCTION

With the recent serious consideration of the role of language as it relates to behavior, psychologists (De Cecco, 1967; Luria, 1961) have given birth to a new area of study termed psycholinguistics. Still more recently the British sociologist, Bernstein (1965) has proposed a social-linguistic approach to social learning drawing heavily on insights derived from the work of the Soviet psychologists, Vigotsky and Luria.

The present study is an attempt to add to the growing body of research resulting from the merging of the social and linguistic sciences. Specifically, the study will examine the role that the social, verbal and experiential environment play in the individual's development of language communication skills.

II. THE PROBLEM

To examine scientifically the relationship of verbal-aural exposure to communication ability, it is desirable that empirical techniques be applied to the problem. For investigation of this relationship, it would mean that relevant factors such as age, sex, and socioeconomic background be held constant while level of language development as an independent variable is systematically

observed. The effect of different environments having different levels of language saturation upon level of communicatory ability, could then be measured.

This study approached the problem of the interrelationship of language skills and verbal-aural experience by examining the language employed by students to describe the story conveyed by a short pantomimed film. Children drawn from an impoverished language milieu should perform less adequately on the writing task than those from an enriched linguistic environment. The current investigation, then, was based on conditions in which level of language development was the dependent variable and the verbal-aural exposure was the independent variable. Other relevant variables such as age, sex and socio-economic variables were held constant or randomized.

An initial problem to be dealt with in the present approach to the relationship of language to verbal-aural experience was that of locating human subjects in whom the level of language development could be varied while simultaneously controlling for or randomizing relevant factors such as sex and age. This seemingly impossible problem was resolved by using deaf children as an experimental group. This was possible as the deaf have a large language deviation from the normal. Lewis (1948) points out that at the age of 5 the average hearing child has a vocabulary of 2,000 to 5,000 words and syntax has been well established. The prelingually deafened 5-year-old child, on the other hand, knows no words not even the names of his foods, or

family members. Obviously, he has developed no syntax. Certainly, if a verbally language-less deaf child is to be compared on tasks that involve language with a hearing, linguistically superior peer, the responses should indicate the extent to which language exposure (i.e. verbal-aural experience) is a factor in communication skill and in thought processes.

An attempt was made to utilize a second group that possessed a retarded level of language development. Of the two hearing groups involved, one came from the lower socioeconomic categories where environmental deprivation has repeatedly been found linked to language deficits. McCarthy (1954), in her exhaustive review of research, quotes several studies wherein increasing verbal skill is found upon ascending the social position index even when subjects are matched for sex, I.Q., age and other relevant variables.

More recent research by Bernstein (1960) in Britain and a rather comprehensive longitudinal study by Loban (1966) in the U.S.A. indicates that low socioeconomic groups do not elaborate sentences as much as do higher socioeconomic groups. Loban's findings on the relationship of language ability and social class are most convincing. His subgroups, originally selected on the basis of high and low language proficiency, were subsequently found to be also representative of social class. That is, those with low language proficiency come from the lower social stratas while the high language proficiency group comes almost exclusively from the upper social stratas.

Thus, a demonstration of the functional relationship between language ability and language exposure should be provided by the performance differences of the deaf and the two socioeconomic stratas of hearing subjects employed in the present study.

A third point requiring emphasis is that much of the research and theory relative to language facility and language development in children is interwoven with implications as to the nature of the cognitive processes. In examining the variables in a child's environment which may govern language acquisition, two approaches occur frequently in the literature with regard to the role of language in cognition. The first approach typified by Loban (1963) and Hunt (1965) ignores the cognitive patterns behind linguistic proficiency. A second more vulnerable approach is typified by such individuals as Luria (1961) and Vernon (1967). In their work, objective measures of verbal performance are interpreted as indications of the thought patterns or mental processes behind the overt actions.

Each polarized point of view has its proponents, nevertheless, considerable doubt as to the worth of either position is warranted. As Milgram (1963) has suggested, thought is covert and unobservable and, therefore, given our present technology, is positively an unknown. On the other hand, viewing the language facility of an individual as an entity apart from the individual's neurological functioning is equally unpragmatic and unproductive.

Research emanating from both of the above orientations has

much to contribute to understanding the role of verbal and aural experience in the development of language skills. Therefore, the present study will draw freely from the researchers and theorists who view language ability apart from its implications for the thought processes and from those who regard language as integral to thought.

Moreover, considerable dependence upon the theory relating to the acquisition of language as proposed by Luria (1961) will be employed as a somewhat loose structural paradigm within which to unfold the significance of this study. Luria's first two propositions (elaborated upon immediately hereafter in Chapter II which deal largely with the process of language acquisition lead to the testable hypotheses. The third proposition, also enunciated in Chapter II, dealing as it does with the relationship of language to the thought process per se, will be carried forward only as a suggestion as to the importance of language to cognition and of cognitive patterns to language acquisition.

The basic underlying general hypothesis is: the extent to which the milieu of a child is verbally saturated is directly related to the extent of his utilization of language for the transmission of meaning.

CHAPTER II

REVIEW OF RELATED LITERATURE

Essentially, the concern of the present study is with the acquisition of language as it conforms to the trilogy of postulates advanced by the Soviet psychologists. Therefore, the initial section of the review will be so structured as to deal with each proposition. The concluding portion will examine procedurally related studies of hearing and deaf children.

I. LITERATURE RELATED TO THE UNDERLYING THEORY

Luria's first principle deals with speech regulation as a complex functional formation built up as an outcome of concrete interaction between the organism and the environment. Supporting evidence as to the necessity for concrete interaction in the acquisition of vocabulary is abundant.

McCarthy (1954) in a review of the literature pertinent to language development quotes several studies wherein the effects of broadening the child's experiences results in rapid vocabulary development. Brigance in one such study noted the increase in vocabulary after a vacation or trip to the seashore. Behrens, also quoted in McCarthy, stresses the importance of varied experience for the acquisition of meaning.

Corroborative evidence as to the necessity for interaction with the environment is readily found in numerous studies of the

effect of social class on language. A study conducted by Young (1944) is exemplary. An analysis was made of records of 74 cases, half of whom had benefitted from Federal Emergency Relief Projects and half, who had no such background. It was found that the regular group surpassed the relief group in all aspects of language attainment that were analyzed. Relief boys were by far the least advanced in language development and regular girls the most advanced.

Luria's twin study reported in Luria and Yudovich (1959) provides a most exhaustive study of the environmental deprivation resulting from prolonged association of a child with one on a par rather than with one of an advanced level of development. In brief, it was found that the objective necessity for speech communication was nearly absent when their association was confined to themselves. In a controlled treatment sequence, the twins were separated and one was put in a situation which did evoke the development of new forms of communication to the extent that he perceptibly surpassed the other in language development.

A study by the Canadians, Blatz, Fletche and Mason (1937) with the famous Dionne quintuplets as subjects, judged language development to be considerably retarded. Again the lower incidence of stimulating child-adult verbal interaction was found to prevent normal language achievement.

Thus, the importance of the child's environment and his interaction with it for the development of speech is widely supported. The evidence is abundant.

The second proposition offered by Luria, was that the process of language acquisition rests upon the development of the child; that is, that his activity itself as he is confronted with new problems and new demands causes the development of new forms of reflex action. Much supportive evidence is available both as it applies to language itself and to perception. That language acquisition is developmental is not really a contentious issue. McCarthy (1954) in her review tabulates the findings of eight major longitudinal and cross-sectional studies of the developmental sequence. Her chart shows a rather narrow range in months for the appearance of identical behavior in the subjects of eight studies.

However, while the developmental aspect of language has much foundation in evidence, the process behind the cognitive functions governing linguistic ability has not often been the object of investigation per se. Nonetheless, support can be found for the contention that new demands and new problems necessitate the forming of language in studies such as the Luria and Yudovich twin study earlier cited. There was an increase in the communication skill of the twin put in the more verbally demanding setting.

Gesture language, Myklebust (1964) points out, can become unusually efficient and elaborate when adults in the child's environment tend to his needs and wants, to the extent that it is almost unnecessary for the child to learn to talk. In treatment reminiscent of that used with the aforementioned Russian twins, refusal on the

part of adults to respond to the child's gesture language usually results in the emergence of language. In essence, this concept is basic to the idea of the "restricted language code" as advanced by Bernstein (1965). He states:

The most general condition for the emergence of this code is a social relationship based upon a common, extensive set of closely-shared identifications and expectations self-consciously held by the members. It follows that the social relationship will be one of an inclusive kind. The speech is here refracted through a common cultural identity which reduces the need to verbalize intent so that it becomes explicit....(p. 155)

One can again appeal to the studies dealing with institutionalized children for foundational evidence. Williams and McFarland are reported in McCarthy (1954) as having given 242 Iowa City children and 64 orphanage children a vocabulary test. They found the orphanage children to possess inferior vocabularies to those city children of the same chronological and mental age when matched for I.Q. level as well.

Gibson and Gibson (1955) point out that in most studies in this connection, the developmental or learning process is assumed to have occurred in the past life of the experimental subject. "True perceptual learning experiments are limited to those concerned with discrimination," they state. They report a study of the cues for verbal learning in which analysis was made in terms of stimulus generalization and differentiation.

Motor reactions, verbal reactions or percepts, we assume are identifying responses if they are in specific correspondence with a set of objects or events. Morse Code learning, aircraft recognition...are examples of an increasingly specific correspondence between the items of stimulation presented and the items of response recorded. As a given response gains univocality, the percept is reported to gain in the feeling of familiarity or recognition and to acquire meaning. (p. 36)

Thus, support is readily available for the second proposition.

Language would appear to be developmental through concrete interaction with the environment.

The third Lurian proposition which places great emphasis on social interaction and in particular, actual communication with adults, can be equally substantiated on the basis of the research evidence. It will be recalled, that the treatment sequence prescribed for children with impoverished linguistic ability, in both the Russian Twin Study and in the pattern set out by McCarthy, was merely to increase the necessity for communication with adults. The studies of institutionalized children who exist in an environment which minimizes contact with adults and maximizes contact with peers of similar deprivation are equally demonstrative of the role of communication with adults in the acquisition of linguistic ability.

Perhaps the most convincing research on the importance of child-adult verbal interaction is that dealing with children possessing serious hearing deficits and with children in the blind category.

Heider and Heider (1940) found in a study of written language by deaf and hearing subjects that the deaf resembled the less mature

hearing children on all indices of performance. Their findings are supported in their subsequent investigations and in many similar studies. Again then, verbal interaction being largely absent because of the lack of the auditory faculty in the deaf is supportive of the proposition under consideration.

McCarthy concludes on reviewing the literature on the linguistic ability of the blind that blindness would not appear to have a retarding effect and anticipates further research to prove it to have a stimulating effect, since the disability forces dependence on others and requires an abnormal amount of adult attention. In the case of the blind then, where unlike that of the deaf, the child-adult verbal interaction component of the environment is considerable, the language learning is normal and perhaps enhanced.

Bernstein rests his socio-linguistic theory upon this child-adult verbal component and derives his dichotomy of language codes (restricted and elaborated) from the quality of the interaction.

The findings of Armstrong (1965) both corroborate and summarize the foregoing examinations of the influence of personal variables on the quality of composition. He found by means of regression analysis that "sex, mental age, chronological age, socioeconomic status and family position, in that order, influence quality of writing."

II. STUDIES OF THE LANGUAGE DEVELOPMENT OF HEARING CHILDREN

There are numerous studies, both longitudinal and cross-sectional of the development of language in hearing children during infancy and early childhood. Among the former those of Loban (1966) and of Piaget (1926, 1928) are typical. Of the latter cross-sectional type of studies those by Gesell and his associates as well as those by Hunt (1965), and O'Donnell, Griffin, Norris, (1967) are examples.

Studies have indicated a direct relationship between maturity level and conceptual ability as expressed in language. Feifel and Lorge (1950) on examining the responses of children on the vocabulary scale of the 1937 revision of the Stanford-Binet, found that younger children tended to perceive words as concrete ideas, whereas older children stressed the abstract or "class" features of a word. Piaget (1926, 1928) also points out that words are intimately related to cognition and concept formation.

Developmental differences are revealed in language structure as well as in vocabulary growth. Smith (1926) as reported by McCarthy (1954) while studying the chatter of young children two to five years of age found an increase with age in sentence length and a decrease in the ratio of simple sentences to compound and complex sentences.

More recent and more comprehensive evidence is available in support of the contention that structural complexity in language is

developmental. Hunt (1965) reports a language study involving students in grades 4, 8, and 12. Using the T-unit, an alternative to the sentence method of language segmentation, Hunt found that T-unit length increases with maturity. As well, 35 other indices of maturity, complexity or proficiency applied in the study demonstrated that communication skill increases through the grades.

In a subsequent study concerning the syntax of 180 kindergarten and elementary school children, O'Donnell et al (1967) state, "without exception...data obtained showed increments in T-unit length from grade to grade."

LaBrant (1933) investigated the language development of children from grades four through twelve and for comparative purposes, looked at the writings of a group of psychologists. The total number of clauses used by each individual was classified into dependent and independent. The prevalence of dependent clauses she expressed as a "subordination index." This she defined as "the ratio of the number of dependent predicates used by each individual or group to the total number of predicates used by that individual or group, the ratio being expressed as a percentage." Her study revealed that the subordination index increased with the maturity of the writers, increase in subordination being paralleled by increasing exactness in the use of connectives. She noted in her high school group that high I.Q. did not appear to exert a marked influence in hastening the use of complex sentence structure, and that chronological age appeared to

exert an influence when mental age was held constant.

McCarthy (1954) points out that whenever groups of boys and girls are well matched in intelligence and socioeconomic background, and when the situation in which responses are recorded does not tend to favor the interests of one sex over the other, there appear slight differences in favor of the girls. The Hunt (1965) investigation of children in grades 4, 8, and 12 reinforces McCarthy's conclusions. Similarly, O'Donnell et al (1967) found that in writing, girls, "were clearly superior to the boys."

Loban (1966), Davis (1937), and McCarthy (1930) all found group differences to be consistently and markedly in favor of the upper socioeconomic levels in all types of language analyses.

Buhler (1931) is quoted in McCarthy (1954) as reporting that:

children from a neglected milieu show retardation in all aspects of their development, but that the retardation is more evident in language. The children from the more favored environment used more words meaningfully at earlier ages, a larger percentage of them were using 2-to 3-word sentences at earlier ages and the same differences were revealed when syntax, inflection, and sentence structure were analyzed.

Young's study (1941) supports these findings. The boys in his study were far the poorest in language development and girls from families in normal circumstances were most advanced in language usage.

Armstrong (1965) employed eight indices of language quality to analyze the written work of 100 grade five students in terms of 25 variables. A sentence from his study will serve to summarize this section. He states, "It might be safe to assume that a young,

intelligent girl who is an only child from a good home would be most likely to write well."

III. STUDIES OF WRITTEN LANGUAGE DEVELOPMENT OF DEAF CHILDREN

Most of the recent major research on conceptual thinking in the deaf and its relation to language has been done by 3 or 4 American investigators. One such study by Kates and Kates (1962) of the Clarke School for the Deaf in Massachusetts focused on two cognitive processes of the deaf, categorization and verbalization. They hypothesized: (1) that deafness would not effect all verbalization processes "in which the material to be ordered is words," and (2) that the problems with verbalization would fall along normal developmental lines and that differences would disappear in adulthood.

The resultant series of experiments utilized deaf and hearing children matched for sex and achievement, and deaf and hearing adults matched for sex, achievement and occupational status. The deaf adults were all graduates of the same school for the deaf. Testing involved the subjects in categorizing 33 everyday objects (a cigar, spoon, etc.) and matching the objects with a preselected sample from the same group of objects and lastly offering reasons for their choice. From this object orientation, the tests were then switched to sorting words.

The results were as hypothesized: the older deaf children performed as did the younger hearing subjects, but no significant

difference was found between the adults. The Kateses concluded that the deaf were developmentally retarded in language usage, but caught up to the hearing adults.

Before these results can be accepted, however, the Kateses' assumption that words are mere labels attached to categories which are "preverbally" known must be examined. They assume that when deaf children can make physical categorizations, yet have not mastered the English word to describe the process, that they have done something on a preverbal basis. They thereby eliminate the possibility that a deaf child's sign may be as "linguistic" as is a word. Moreover, naming the attribute abstracted from reality is not merely labeling something experienced; rather, it is making that experience available for higher level abstractions and therefore, for more complex descriptions of reality. After all, animals know what is food and non-food, light and dark, yet these categorizations are not available to them for abstraction into higher systems since they cannot symbolize. Therefore, the Kateses may be underestimating what the deaf actually can do by ignoring sign-language. Perhaps further experimentation should consider the presence of signing in the deaf.

One further objection to the Kateses' results deals with the adult samples. The deaf adults were all graduates of a school for the deaf which, if the statement found by the writer in Kohl (1966) is true, makes them a very select sample of deaf subjects. Kohl cites U.S. Government statistics to the effect that only 50.6% of the

deaf graduate from an elementary school. Thus, it is conceivable that the Kateses may have matched a well-educated deaf population with a relatively uneducated hearing population.

Furth (1964) surveys the literature under discussion and presents his own experiments which purport to show that the capacity of deaf people to deal with conceptual tasks may not be retarded or impaired and that language does not influence intellectual development. Furth employed three tests: a sameness test, a symmetry test, and an opposition test. The hearing group was superior to the deaf group only on the opposition test which he contended required the use of language, whereas, the other two did not. Why "opposition" demands language any more than "sameness" or "symmetry" was not clarified by Furth. This aside, his conclusion that the influence of language on concept formation is "extrinsic and specific," puts his study in the same questionable light as that of the Kateses. Neither seems to have considered that the deaf subject's sign-language may have been incorporative of concepts necessary to solve his tasks.

Rosenstein (1961) has reviewed the literature relating to the cognitive abilities of the deaf. While his treatment of each study is necessarily brief, it would appear that most such studies do neglect to control for sign language as a relevant variable. Rosenstein's (1960) own study is open to the same charge of neglecting sign language as a linguistic system the child may know. In addition, his tasks were very simple as is evidenced by the fact that

all subjects responded correctly to all of the ten tasks on his perceptual discrimination test. All of his tests produced no distinctions between the deaf and hearing subjects, leading him to conclude that no differences exist between deaf and hearing subjects where the language involved in the task is within the capacity of the deaf children.

Goda (1957) investigated the language skills of 56 subjects, 32 male and 24 female, profoundly* deaf, who were attending a residential school for the deaf.

At the time of the study his subjects were fairly evenly distributed over ages 12, 13, 14, and 16 to 18. He concluded that: (a) there is a consistent interrelationship between language skills - writing, speaking, reading and lipreading - so that the deaf child who is superior in one will generally be superior in others, and (b) there is a quantitative and qualitative relationship in language so that the child who uses more words will generally express himself in more complex sentences.

Myklebust (1960) sought to make a comparison of hearing and deaf students in various aspects of language ability. His deaf sample was selected on an unstated basis, to a total of over 600. The author is reported to have gathered his data by correspondence

*A term applied by special educators to deaf persons who possess residual hearing at a level which makes it functionally non-existent.

and questionnaire methods on a basis of standardized tests and teachers' ratings. Comparison groups of hearing children were used in the study but the basis for comparison is not clear. No mention is made, for example, of socioeconomic status as a variable in the study. Among the findings reported was a positive correlation between lip-reading ability and reading ability and written language ability. The deaf group was found inferior to the hearing group on sentence length, syntax in written language, and in abstract and concrete concepts in a written story at all levels.

IV. THE HEIDER AND HEIDER STUDY

Studies of written language based on measurement through standardized tests are dependent upon an artificial language situation. It is anticipated that a more accurate picture is to be derived from investigation in a free-writing situation. Of this, the Heiders' (1940) study is a good model.

Their study sample consisted of 301 residential school deaf children drawn from three schools along the Atlantic seaboard of the U.S.A. and 817 hearing children from three regular schools in that same general area. In the study, children were asked to write a composition telling the story of a short motion picture they had been shown. The age ranges were 8 to 14 years inclusive for the hearing children and 11 to 17 years inclusive for the deaf. The lower limits of both groups were chosen as being the earliest at which hearing and

deaf children were thought to be able to write the story, the three year difference, the Heiders claim, is in accord with findings accepted by educators of the deaf.

The resulting material was analyzed both quantitatively and qualitatively. Quantitative analysis focused on average lengths of composition, lengths of sentences, frequency of different types of sentences, frequency of finite verbs classified according to the functions of the clauses in which they occurred, frequency of verbals, and frequency of prepositional phrases. Qualitative analysis was chiefly concerned with differences in style which the Heiders suggested, might represent differences not merely in language usage, but differences in thought structure as well.

V. SUMMARY AND STATEMENT OF SPECIFIC PROBLEM

It is the intent of this investigation to build upon the Heider and Heider study by taking into consideration some of the variables which the references earlier cited have shown related to language development. Firstly, by allowing deaf subjects to request the English equivalent of a sign they possess in their conceptual repertoire, recognition will be given to sign language as a linguistic system, thereby, overcoming the objections to the Kates and Kates, Furth and Rosenstein studies. In addition, consideration in the present study will be given: to differences related to opportunities to hear and to use speech (Luria, 1959); to environment (Myklebust,

1960); to differences related to socioeconomic level (Day, 1932; Davis, 1937; Young, 1941) and to differences related to sex (McCarthy, 1954).

VI. HYPOTHESES

The study will involve a comparison of the written language patterns of deaf (D) children with two socioeconomic levels of hearing children: an upper (USH) and a lower (LSH), to test the following hypotheses.

1. Performance in the writing task as measured by mean T-unit length will be lowest for the D group, higher for the LSH group and highest for the USH group.
2. A sex difference in performance in favor of the female subjects will be found in all three groups.

CHAPTER III

EXPERIMENTAL DESIGN AND PROCEDURE

I. THE SAMPLES

Two populations were sampled. The first sample consisted of pupils of the Alberta School for the Deaf and the second was comprised of pupils in attendance in elementary and junior high schools of the Edmonton Public School Board.

The Deaf Sample

The population of the Alberta School for the Deaf is drawn from the entire province.* Home postal addresses indicated that the students' families reside on farms, in rural towns and in larger urban centers. Admittance to the School for the Deaf is largely contingent upon the student being an Alberta resident, unable to profit from instruction in a regular school classroom due to an auditory deficit. The candidates must possess good physical health and demonstrate sufficient mental ability to profit from admission.

With little variation, the admittance procedure involves five steps. Initial referral to the school is followed by formal parental application for consideration of their child as an enrollee. The

*Some students (3 of D group) are from the Northwest Territories. Such individuals are admitted under Federal Government financial sponsorship.

application form includes a personal history inventory and a physician's report. Upon review of this application the parents and the child are invited to the school for assessment purposes. Also, at this point school staff prepare an initial audiological report. Immediately, thereafter, the child undergoes a two to three day assessment at the Alberta Pre-School Deaf Clinic at the University Hospital and at the Alberta Guidance Clinic. Assessment personnel from all participating agencies attend a conference regarding the child and make recommendations concerning his enrolment.

No actual decibel loss figure is set as an arbitrary base for admittance. Variation of etiology and amenability of the hearing deficit to remediation result in considerable change and imprecision.

In the case of the sample, all students possessed hearing losses at or greater than 60 decibels in the normal speech frequencies of 250 to 4000 cycles per second as determined by the Beltone 15-B Clinical Audiometer. All subjects had been tested within 8 months of the time of the investigation. The mean decibel loss of the sample was between 75 dbs and 100+ dbs through the 250 to 4000 cycle per second range.

The school is educationally oriented; a fact most important to realize, since the school population is in the vast majority in residence at the school.

Subsequent to discussions with school officials, 48 students were selected to participate in the experimental procedure. The

sample represents all the students between the ages of 10 and 16 years inclusive, who were regular residential students and free from gross multiple defects (e.g. mental retardation and limited vision). Of the 48 pupils, 27 were boys and 21 were girls. Table I presents the distribution of ages according to sex.

TABLE I
DISTRIBUTION OF DEAF SUBJECTS
BY AGE AND SEX

AGE	NO. OF BOYS	NO. OF GIRLS	TOTALS
10	4	3	7
11	6	3	9
12	3	5	8
13	7	1	8
14	6	4	10
15	1	3	4
16	0	2	2
TOTALS	27	21	48

The Hearing Sample

The hearing groups utilized in the study were obtained from a sample of Edmonton Public School Board elementary and junior high school students. Permission was obtained to conduct the experiment in two of the elementary schools and in one junior high school.

The first elementary school was located in a recent suburban housing development in a district drawing upon children of middle-class

background. Housing in the area was largely that of single-family units. However, several large multiple-family apartment buildings did exist within the school boundary.

The second elementary school was located on the north side of the city and served children who came from a deterioration district characterized by low-rental, multiple-family dwellings and low-cost single family homes. The district population was relatively stable with the exception of the families of itinerate workers from the rental accommodations. Thirty-one of the 49 students who participated in this experiment had received all their education at this elementary school. On the Blishen Scale* all of the students fell below the mean.

The junior high school students who participated in the experiment attended a school which drew on a wider range of residential accommodation. Within the school service area to the north, was a deterioration district comprised largely of small homes, constructed before city building codes were applicable. In contrast, beginning immediately adjacent to the south of the school, the residences ranged from middle income homes on compact 50 foot frontage lots to mansions set on acreage estates overlooking the river valley. To the east and west of the school were low-rise apartment buildings. Students from this junior high school were representative of every social class with

*The Canadian Occupational Scale developed by Blishen is examined more fully, later in the present chapter.

the exception of the upper-upper class, which if present in Edmonton, is in very small numbers (Elley, 1961).

A sample total of 146 students drawn in approximately equal numbers from the schools described, participated. Of this number, 9 were later omitted as insufficient information was available to permit meaningful assignment on the social class scale. Thus, of the 146 hearing students who participated, 137 were assigned values on the Canadian Occupational Scale constructed by Blishen and constituted the hearing sample.

Students in the hearing sample were then ranked from lowest to highest according to their Blishen rating. The lowest one-third of the sample were termed the Lower Socioeconomic Hearing group (LSH) and the highest one-third were termed the Upper Socioeconomic Hearing Group (USH).

The age and sex distribution for the LSH and USH groups appears in Table II. The lower age limits for all groups was the earliest at which students could complete a written account.

II. INSTRUMENTS

Two instruments were employed in the present investigation. They were the Blishen Canadian Occupational Scale and an untitled pantonimed film.

TABLE II

DISTRIBUTION OF HEARING SUBJECTS BY
AGE, SEX AND SOCIOECONOMIC GROUPING

AGE	LOWER SOCIOECONOMIC			UPPER SOCIOECONOMIC		
	NO.OF BOYS	NO.OF GIRLS	TOTALS	NO.OF BOYS	NO.OF GIRLS	TOTALS
7	2	1	3	2	2	4
8	3	1	4	1	6	7
9	3	6	9	2	7	0
10	12	2	14	2	1	3
11	3	3	6	2	3	5
12	1	5	6	9	4	13
13	3	0	3	1	3	4
TOTALS	27	18	45	19	26	45

The Blishen Canadian Occupational Scale

The Canadian Occupational Scale constructed by Blishen in 1958 is an objective scale based on data from a Canadian national census. Blishen considered both the mean income and number of years training required for each of 343 occupations to which he assigned values ranging from 32 to 90 with a mean of 50 and a standard deviation of 10.

Elley (1961) reports that the scale appears to give predominant weight to the amount of responsibility involved and to the extent of training required, both significant factors in subjective rankings of occupations. He reports a correlation of .94 between Blishen's Scale and Hatt's "National Opinions Research Centre Index," a United States

counterpart. Moreover, Elley found in a random sampling of over 400 Edmonton grade VI pupils that almost all levels of the Blishen Scale were well represented. The mean occupational t score of the local sample was only 1.63 higher than Blishen's mean of 50, and the sample standard deviation was 9.35, a scant 0.65 points less than Blishen's value.

Accordingly, with this empirical justification available, the Blishen Scale was selected to obtain socioeconomic status estimates for the present study.

The Untitled Film

The 3 minute untitled pantomimed film used in the study was produced privately for the investigator by the Educational Television Production Manager of the Edmonton Separate School Board. It is on Super 8MM film in colour, the script of which, appears in the Appendix. The film sequence is as follows:

A young girl is sitting on a footstool before a television set. Behind her is an opening into another room in which a table can be seen. Upon the table is a bowl of green apples and seated at the table is a woman reading a paper. The girl leaves the stool enroute to the table, reaches an apple, then gives her attention to her mother who makes motions to suggest that the girl may have only one. The girl returns to her stool and her television program while consuming the apple.

She then returns stealthily to the table, this time with the mother absent from the scene, to secret a second apple. Shortly, she steals back for a third apple again reseating herself before the television set. Presently, she slumps forward, rolls to the floor holding her stomach. The mother reappears, points to the three cores and shakes her head.

III. THE MINIMUM TERMINABLE UNIT

Much of the related research has relied upon sentence length and formal grammar for analysis of the language of the children involved, despite the numerous pitfalls to such an approach with average children and in particular with the deaf. (Vernon, 1967; Kohl, 1966)

Young children are most content to juxtapose thought after thought without heed to punctuation or meaningful co-ordination. For example, Loban (1963) reports the occurrence of one 77 word run-on sentence that constituted the whole theme submitted by one youngster in his investigation. Length of sentences, then, is hardly an index of maturity and in many instances is actually inversely related to maturity. (Hunt, 1965)

An alternate, more reliable, easily determined, objective method of segmenting writing which lends itself to quantitative work was first proposed by Watts in 1948. He called it the "Natural Linguistic Unit." Loban further delineated it and proposed the term, "Communication unit," but the name applied by Hunt appears to capture the essential qualities of the unit more completely. Hunt's terminology is "Minimum terminable unit," reflecting the idea that it is the smallest unit, "grammatically capable of being terminated with a capital and a period," while preserving essential meaning.

The minimum terminable unit was selected as a superior measure for the present investigation and is termed the T-unit, hereafter, in accordance with Hunt's practice.

As an index of maturity, the T-unit has the advantage of preserving all subordination achieved by a student and all co-ordination between words, phrases or subordinate clauses. Below is a sample of student writing after which appears the same theme divided into T-units with capitals and periods designating beginnings and ends of T-units.

Subject's Writing

A little girl went for an apply because she was hungry. Her mother told her to eat only one and she took another one and another one and got a tummy ache.

Example of T-Unit Division

T-Unit Division	T-Units	No.of Words Per T-Unit
A little girl went for an apple because she was hungry.	3	11
Her mother told her to eat only one.		8
And she took another one and another one and got a tummy ache.		13

Examination of the foregoing demonstrates the superiority of using T-unit length rather than sentence length as an index of maturity. Children can destroy the significance of sentence length by their marked tendency to string sentences together with "and."

Further to the practicality of the T-unit, is the ease with which it is understood and determined, whether the grammarian is of structural, transformational or traditional background. For example,

Hunt found almost perfect interjudge reliability among the investigators employed in his study.

Hunt provides a comparison of the success of the T-unit in determining maturity over and opposed to the older less specific indices. Table III provides the data from the Hunt study (1965).

TABLE III

SUCCESS OF VARIOUS INDICES IN SEPARATING GRADES

	Number of fourth graders overlapping eighth graders	Number of fourth graders above the mean for eighth graders	Number of eighth graders overlapping twelfth graders	Number of eighth graders above the mean for twelfth graders
Sentence length	10	4	14	5
Sub- ordination ratio	14	2	10	1
Clause length	3	0	15	7
T-unit length	2	0	8	1

When the same four measures were compared by means of contingency co-efficients to determine the best indicator of grade level, Hunt found the T-unit best (.694) and sentence length poorest (.489).

However, the power and sensitivity of T-unit length as a measure of language development is its greatest contribution. The older more procedurally complicated counts of forms and ratio transformations are contained in essence in the T-unit length concept. The correlations between these measures and T-unit length offered in Table IV (after Hunt, 1965, p. 37) indicate the comprehensiveness of this index of language development.

TABLE IV
VARIABLES RANKED BY ORDER OF CORRELATION
WITH T-UNIT LENGTH

NAME OF VARIABLE	CORRELATION
T-units shorter than 9 words	-.902
Mean clause length	.836
Ratio of clauses per T-unit	.831
Total of 3 commonest nominals (unmodified)	.818
Counts for "complexity" of nominals	.772
Counts given to nominals with counts of 2 or more	.769
Intransitive verbs with complements of motion	-.728
Noncomplement adverbials of motion	-.725
Personal pronouns including it	-.685
Counts given to nominals with counts of 2 or more	.672
Gerunds	.660
Adjective Clauses	.615
Adverbials of manner	.606
Prepositional phrases as noun modifiers	.560
Passives	.519
Total of 6 modals	.516
"Progressive" forms (be and present participle)	-.461
Intransitive verbs	-.445
Genitives as noun modifiers	.436
Mean sentence length	.429
Unmodified common nouns	-.403
Ratio of T-units per sentence	-.381
Factive infinitivals	.368
Prepositional phrase complements to adjectives	.329
"Perfect" forms (have and past participle)	.318

Furthermore, other studies employing the T-unit length measure such as those of Loban (1963, 1966) and O'Donnell et al (1967) offer strong support for the utility of this measure, for discerning developmental differences in children of different grades, sexes and socioeconomic classes.

Thus, T-unit length as defined herein and by Hunt was employed as the basic quantitative device.

IV. PROCEDURE

Administration Procedure

All subjects were told by the author either in words or through an interpreter in sign-language:

You are about to see a short film. It is a film that tells a story. You are going to see it only once. After it is over, I am going to ask you to write out the story of the film for me. Watch it closely. Please do not talk to your classmates about the film.

Immediately after the film presentation, personal information sheets stapled to single sheets of foolscap were passed out and the students were assisted in filling out the personal information sheet.

They were then asked to write out the story-line of the film and to spell words the best that they could, but not to request spelling assistance. A time limit of 20 minutes had been intended but never had to be imposed as the subjects without exception completed the task before the elapse of 20 minutes.

As will be recalled from the review of the literature (see

Chapter II), a major objection to previous pertinent studies was their lack of recognition of the deaf subjects' sign language as a mediating process. Accordingly, deaf subjects were allowed to ask their teacher for English equivalents to signs which they were unable to translate themselves. No similar teacher assistance was permitted for the hearing subjects.

Scoring Procedure

The resultant 138 papers were then marked. Many youngsters made a number of false starts or simply fumbled and lost direction, giving rise to incomplete thoughts or unrelated fragments within their writing which they most often allowed to stand undeleted.

Hunt termed such fragments "garbles" and Loban called them "mazes." In the present study, all garbles or mazes which were judged clearly extraneous were deleted. Then the themes were divided into T-units, following which each paper was tallied as to number of T-units and as to total number of words. Appendix B contains all relevant raw data.

CHAPTER IV

FINDINGS AND CONCLUSIONS

HYPOTHESIS I

Performance in the task as measured by mean T-unit length will be lowest for the D group, higher for the LSH group and highest for the USH group.

Findings

The writings of all students were divided into T-units and the mean length of T-units was computed for each student in each group.

The mean T-unit lengths and standard deviations for each group appear in Table V.

TABLE V

THE MEANS AND STANDARD DEVIATIONS OF
T-UNIT LENGTHS FOR THE THREE GROUPS

GROUP	D	LSH	USH
Means	5.94	9.43	11.76
Standard Deviations	1.22	2.66	1.88

An analysis of variance of the mean T-unit length for all groups was performed to determine whether the observed differences were significant. A summary of the analysis of variance is presented in Table VI.

TABLE VI

SUMMARY OF ANALYSIS OF VARIANCE OF MEAN T-UNIT
LENGTH FOR THE D, LSH AND USH GROUPS

SOURCES OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	VARIANCE ESTIMATE	OBTAINED F-VALUE	SIGNIFICANCE
Sex	2.09	1	20.88	5.26	P .02
Group	744.98	2	372.49	93.91	P .001
Between	4.08	2	2.04	0.51	P .60
Within	523.59	132	3.97		

As the F-ratio is significant for group differences beyond the 5 percent level of significance, the Newman-Keuls method was used to examine the differences between all possible pairs of means. The results of these tests appear in Table VII.

TABLE VII

NEWMAN-KEULS TEST OF DIFFERENCES
BETWEEN ALL PAIRS OF MEANS

GROUPS	DIFFERENCE	SIGNIFICANCE
LSH-D	3.49	P .01
USH-D	5.82	P .01
USH-LSH	2.33	P .01

Thus, confirmation of Hypothesis I was obtained. The D group were significantly lower than the LSH group in mean T-unit length. The LSH subjects, in turn, were significantly lower than the USH subjects in mean T-unit length.

HYPOTHESIS II

A sex difference in performance in favor of the female subjects will be found in all three groups.

Findings

The written work of each student was divided into T-units and the mean length of T-units was computed for each group and for each sex within each group. The results are presented in Table VIII

TABLE VIII

MEAN T-UNIT LENGTH BY SEX AND GROUP

SEX OF SUBJECT	DEAF \bar{x} T-UNIT LENGTH	LSH \bar{x} T-UNIT LENGTH	USH \bar{x} T-UNIT LENGTH
Males	5.810	9.048	11.122
Females	6.115	9.998	12.233

It may be recalled that the F-ratio is significant for sex for the total group beyond the 5 percent level (see Table VI). To test

the hypotheses, three tests of the separate differences between means were made by the t-test. The results of these tests are shown in Table IX.

TABLE IX
SIGNIFICANCE OF DIFFERENCES BETWEEN MEANS
OF T-UNIT LENGTH OF SEX WITHIN GROUPS

GROUPS	DIFFERENCE BETWEEN MEANS	SIGNIFICANCE
Deaf F-M	.305	N.S.
LSH F-M	.950	N.S.
USH F-M	1.111	P .05

The t-test revealed no significant differences exist between the male and female performance within the D and LSH groups, but the difference between the USH girls and boys' performance on the task was found significant at the .05 level. Therefore, Hypothesis II must be rejected, even though support was found.

III. CONCLUSIONS

The conclusions which appear warranted on the basis of this study are:

1. Performance in a free writing task as measured by mean T-unit length is lowest for the deaf students, higher for lower socioeconomic students, and highest for upper socioeconomic students.
2. There are no significant differences between the performance of males and females in the deaf and lower socioeconomic hearing students. However, in the upper socioeconomic hearing students, female performance exceeds that of males

CHAPTER V

DISCUSSIONS AND IMPLICATIONS

I. DISCUSSION

The results of this experiment are supportive of the underlying general hypothesis and, therefore, the hypothesis may now be offered as a conclusion. That is, the extent to which the milieu of a child is verbally saturated is directly related to the extent of his utilization of language for the transmission of meaning. Figure 1 below illustrates the relationship between level of language exposure and group mean T-unit length.

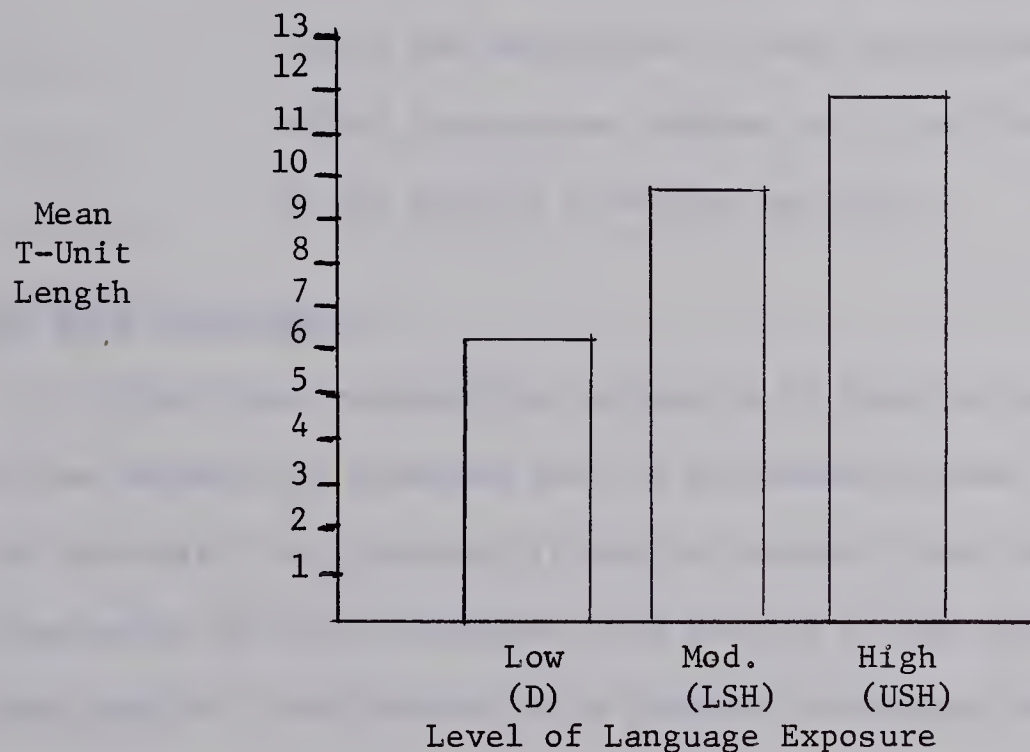


Figure 1

RELATIONSHIP BETWEEN LEVEL OF LANGUAGE
EXPOSURE AND PERFORMANCE

In other words, empirical confirmation was obtained for the view that the integration of verbal cognitive processes is explainable by Luria's aforementioned theoretical propositions. In capsulized form, those propositions were:

1. All verbal processes are complex functional formations which are built up as an outcome of concrete interaction between the organism and its environment.
2. Each stage of development presents the organism with new demands and new problems which necessitate the development of new forms of reflex action.
3. Human mental activity occurs in conditions of social communication at which time a child acquires from adults the experience of many generations. Such verbal intercourse changes both the form and content of the child's conscious activity.

The Deaf Performance

The first proposition calling as it does for concrete interaction between the organism and its environment poses special problems for the deaf. For although it may be accepted that their primary orientation is to the concrete, the quality of the interaction is questionable. Deaf people are a somewhat submerged socioeconomic group. Vernon (1967), Kohl (1966) and others describe the deaf as being employed in the vast majority in unskilled occupations. At least 10 percent (Kohl) of the deaf children are born into this

community to deaf parents. At once the disadvantage of a lower income and lower socioeconomic home descends upon a number of the deaf children. That the concrete interaction of such youngsters with their environment lacks variety, is well substantiated. At school age the vast majority of deaf children enter a residential school where contact with the environment runs parallel to the formalities of institutional confinement. Excursions to the grocery store, dry cleaners and involvement with the routine of household operation are often limited to the holiday season. Thus, the deprivation (see Chapter II) of institutionalization, accompanies that of the socioeconomic disadvantage.

In summary, many of the deaf children are deprived of meaningful concrete interaction by the limitations of deaf parents, by belonging to a lower socioeconomic strata and by early institutional confinement. Therefore, many of the deaf youngsters have a considerably limited opportunity to form the mental structures, which Luria suggests arise from concrete interaction with the environment.

These variables summarized above, also entail consequences for the deaf child in relation to the second proposition advanced by Luria. For as the child progresses through his developmental stages, he is confronted with a much narrower range of problems or demands to challenge his cognitive processes. The institutional staff change his bedding, prepare his meals and set his hours of arising and retiring. In short, while the formal education he receives is based on a

developmental theory, the deaf child's institutional confinement does not have a comparable developmental basis.

The institutionalization also subjects the child to limited child-adult interaction (McCarthy, 1954). Therefore, the third proposition mentioned earlier becomes involved. In the case of the institutionalized deaf, social intercourse is mainly with peers, excepting for the brief formal teacher-pupil classroom contact. If as Luria postulates, child-adult social intercourse changes both the form and content of the child's conscious activity, the consequences for the deaf are most debilitating. The present study is indicative of the developmental difference between the deaf and hearing groups, caused by the lower incidence of child-adult interaction for the deaf. The following findings from studies concerning the deaf appear as isolated facts until viewed in the light of Luria's theory on the role of adult companionship in mental development. Nass (1964) noted in comparing deaf and hearing groups on "peer reciprocity versus dependence on adult authority," that the deaf were less concerned with pleasing authority and more concerned with peers. Altshuler (1962) and Myklebust (1960) have both found a significant relationship between the acquisition of language and social maturity in the deaf. Thus, when seen in terms of Luria's proposition, it becomes evident that the lack of adult contact is debilitating to the deaf child in the language sphere, as well as in related language-dependent learning.

The interplay of the concrete orientation of the deaf with

their narrowed range of developmental opportunities and their seriously circumscribed child-adult interaction, would appear responsible for the great disparity between the deaf and hearing subjects found in the present study. The seriousness of the deaf subject's performance disparity becomes evident when it is recalled that the experimental design included firstly, a three year age differential in favor of the deaf. Secondly, the design also permitted the deaf the opportunity of assistance in translating their thoughts into English.

The Female Performance

Only in the case of the USH group did the female performance significantly exceed that of the male subjects. However, for the LSH the difference observed in favor of the female performance approached significance, while on the other hand in the D group, the difference between the sexes was definitely not significant.

Moreover, these findings can be viewed as being supportive of the Lurian theory. That is, both the hearing groups were near or were significant in sex difference, while the deaf group failed to show a difference between males and females. For the deaf youngster, regardless of sex, the vital linguistic quality in parental or adult interaction with them was largely missing. Therefore, if language is the prime medium for the transmission of mental structures and perceptual modes, as Luria proposes, the results as obtained could have been anticipated from the theory. Likewise, the smaller difference between the LSH males and females than that between the USH males and females

could have been anticipated. For the quality and quantity of verbal interaction between children and adults does increase from practically none in the case of the deaf, to some for the LSH group and to a considerable extent in the case of the USH subjects. The obtained results do in fact add to the credibility of the underlying theory.

The Hearing Subjects' Performance

The performance discrepancy between the lower and upper socioeconomic hearing subjects was as anticipated. Many heretofore unmentioned variables such as motivation (Rosen, 1956) and values (Strodtbeck, 1958) have been found significant in regard to the attainment of the lower socioeconomic classes. Nonetheless, the theoretical postulates laid down by Luria would appear to be intimately related to the lower performance of the LSH group as compared to the USH group. Reconsidering the Soviet theory for the LSH group, as was done for the deaf, would amount to simple redundancy. However, the theoretically related position taken by Bernstein (1965) in his socio-linguistic theory of learning would appear to warrant mention. Bernstein has defined two language codes, the restricted code and the elaborated code, characteristic for the most part of the lower and upper social classes respectively. Of the effect of this linguistic code, Bernstein says:

Children who have access to different speech-systems (i.e. learn different roles by virtue of their status position in a given social structure) may adopt quite different social and intellectual procedures despite a common potential. (p. 152)

The experiment, herein reported, lends empirical justification to the position stated by Bernstein. The differences between the LSH subjects and the USH subjects were in favor of the upper social strata, who in theory possess the elaborated code.

II. IMPLICATIONS

Research Implications

As a result of applying the Lurian theory on the relationship of cognition and verbal interaction in this study, certain related psychological problems have emerged. In particular, further research is required into the cognitive development of the deaf. An interesting psychodynamic approach to the hearing impaired would be a comparison between the environmental deprivation effects of deafness and those derived from selected homebound disabilities and socioeconomic deprivation among the non-disabled. Another approach would be to replicate Luria's own research with twins where one is deaf and one is hearing.

Another vast area where little work appears to have been done is with the nature of sign-language. For, if as Vernon (1967) and others (Kohl, 1966; Milgram, 1963) suggest, the cognitive mediation process of the deaf is founded on signs, then two facets of signing require examination. These are: (1) the extent to which sign-language can convey higher level abstractions and (2) possible methods of enhancing signing as a linguistic alternative and as a bridge to

greater verbal attainment.

The suggestion that the concrete interaction of the pre-school deaf child with his environment may lack quality and diversity deserves some attention. A comparison of deaf children who are graduates of a kindergarten for the deaf with non-graduates might be one avenue of investigation into the effect of the absence of diverse or quality interaction in the child's early years.

The statistics presented which show that fewer than 51 percent of the deaf graduate from an elementary school have vast implications for research projects. One such project arising out of the current experiment would be to examine the educational attitudes of the adult deaf subculture. For it will be recalled, child-adult interaction appears to change both the form and the content of the child's mental processes.

Educational Implications

The above implications for research are intimately related to educational practice. The deprivation facing many of the deaf children through their submerged social status and their probable institutionalization suggests a "higher horizons" type of program for the deaf.

As a step toward greater verbal interchange of adults with deaf children, residential deaf schools could simulate home conditions in their residences. Smaller units, fitted with kitchenettes and familiar appliances attended by house parents could enhance

development. Also, by doing away with separate dining facilities for the staff and students, the informal child-adult interaction would be increased.

In a similar vein, relating school experiences to concrete realities via excursions to stores, commercial plants and points of interest should result in increased learning opportunities. Perhaps a revival of the old Alberta Enterprise approach with the core theme centering around a store, a garden, or a home would assist the deaf youngsters to grasp the cognitive referent behind the verbal curtain. To some extent, the lower socioeconomic hearing children would be candidates for similar educational endeavors.

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A P P E N D I C E S

A P P E N D I X A

THE UNTITLED FILM SCRIPT

Cast: 10 year old girl

Child's Mother

Set 1

Properties: Television set

Hassock

Set 2

Properties: Table

Chair

Bowl of green apples

Newspaper

Sequence

Shot 1: Child sitting on hassock watching T.V. (set 1).

Shot 2: Child gets up, walks through to set 2, takes an apple.

Shot 3: Mother and child (set 2) Mother indicates by fingers that only one apple is to be taken.

Shot 4: Child returns to set 2 to watch television.

Shot 5: (set 2) Child drops core on carpet.

Shot 6: Repeat shot 2 excepting for absence of the mother.

Shot 7: (set 2) Child resumes watching T.V.

Shot 8: (set 2) Repeat shot 5.

- Shot 9: Repeat shot 6.
- Shot 10: Repeat shot 8.
- Shot 11: (set 2) Child leans over holding her stomach, opens her mouth in pain.
- Shot 12: (set 1) Mother reappears from set 2, holds the child, points to discarded cores, shakes her finger.
- Shot 13: Zooming in on bowl with only one apple remaining.
- Shot 14: Zooming in on discarded cores.

Black out.

APPENDIX B

BASIC DATA OF THE STUDY

Key to the data presented below:

Column 1 represents sex, 1 = M, 0 = F.

Column 2 represents group, 1 = Deaf, 2 = LSH, 3 = USH.

Columns 3 and 4 represent individual I.D. numbers.

Columns 5 and 6 represent the age of the subject.

Columns 7 and 8 represent the total number of T-units used in the writing task.

Columns 9, 10 and 11 represent the total number of words used by the subject in the writing task.

11011427146	01271112068	12051011113
01021321155	11281112056	02061109115
01031615104	11291111050	12071006074
11041420152	11301316126	12081107096
11051514101	01311420123	12091009091
11061316137	11321421107	12101111125
01071510057	11331317144	12111111126
01081515110	11341224149	12121002019
01091615138	11351427191	12131009109
11101317090	11361108035	02141012103
01111218100	11371115077	02150816119
01121213083	01381107036	02160908088
11131318099	11391007039	12170706029
01141415100	11401008039	02180705035
11151217101	11411011057	12190801004
11161413056	11421019083	12200806047
01171409046	01431006026	12210704025
01181421130	11441024102	12221105055
01191216094	11451109048	02231207068
01201218095	01461012062	02241107086
11211316098	01471519141	02251206055
11221313101	01481010055	12261310119
11231416082	12010911055	12271303051
01241127132	02021009085	12281211150
11251208040	12030903021	02291207084
01261213085	12041015131	02301207058

13011004042
13020912153
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03040811157
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03060706063
03070913164
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13100706064
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03121306079
03131206087
13141011122
03151108102
03160912153
03171308088
03180822191
13191210112
03201210136
13211206068
13221307073
03231209091
13241207093
13251206061
03261305064
13271207098
13281205048
13291209123
13301207073
13311210122

13320910098
03330908098
03341020239
03350811156
13361108109
03370911147
03381115203
13390815102
03400812168
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03451109117

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